

JAPANESE

[JP,2002-069472,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the lubricant composition which is excellent in abrasion resistance, and an extreme pressure property and the low friction characteristic in more detail about the lubricant composition supplied to a mechanical-friction sliding part.

[0002]

[Description of the Prior Art]Using a liquid crystallinity compound etc. for a lubricating oil or a lubricant composition is studied from the former. For example, in the Patent Publication Heisei No. 503326 [two to] gazette, the thermotropic liquid crystal phase of a liquid crystal and transition of an isotropic interphase are used, and using a liquid crystal as a lubricant composition is proposed as a fluid organism used for the machine part under variable friction. In JP,2-21436,B, the chronometer oil constituted mainly with the mixture of a liquid crystal or two or more liquid crystals, especially the nematic liquid crystal is proposed. In JP,7-82582,A, the lubricant in which a liquid crystal compound and the lubricant composition containing fluorine oil contain sulfur-containing phthalocyanine or the liquid crystallinity compound of a metal complex by JP,10-279973,A again is proposed.

[0003]However, the art which uses a liquid crystallinity compound etc. as lubricant alone in spite of these proposals, The art which is made to dissolve a liquid crystallinity compound etc. in lubricant base oil, and is used as a lubricant composition also seldom progresses, it excels in abrasion resistance, and an extreme pressure property and the low friction characteristic, and the lubricating oil or lubricant composition containing a practical liquid crystallinity compound etc. is not yet obtained fully. Especially in the sliding part of a mechanical apparatus, the degree of cruelty of a lubrication condition excels [weight saving / an elevated temperature, a high speed or a low speed a heavy load, / small] in performances, such as increase, still much more abrasion resistance, an extreme pressure property (load carrying capacity), the low friction characteristic, and practical lubricant is called for in recent years.

[0004]

[Problem(s) to be Solved by the Invention]the purpose of this invention -- mechanical-friction sliding part **** -- it excels in abrasion resistance, an extreme pressure property, and the low friction characteristic, and is in providing a practical lubricant composition.

[0005]

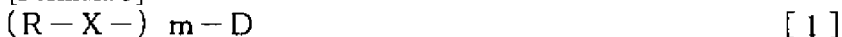
[Means for Solving the Problem]In a lubrication condition with a severe compound which has

a specific structure, this invention persons found out that especially a low friction coefficient was obtained in boundary lubrication or mixture method lubrication, as a result of inquiring wholeheartedly, in order to conquer a problem of said conventional technology. This invention comes to be completed based on these knowledge.

[0006] That is, according to the invention of the 1st of this invention, a lubricant composition which carries out the feature of containing a compound expressed with the following chemical formula [1] as the main ingredients is provided.

[0007]

[Formula 3]



[0008] (Among a formula, D is heterocyclic residue of 5 thru/or 7 membered-ring structures located at the center of a molecule, and expresses the compound residue of cyclic structure which arranges m side chains radiately.) X expresses respectively the connecting group of the bivalence which consists of a single bond, NR^1 group (the carbon number of R^1 is the alkyl group or hydrogen atom of 1-30), an oxygen atom, a sulfur atom, a carbonyl group, sulfonyl groups, or such combination independently. R expresses an alkyl group, an alkenyl group, an alkynyl group, an aryl group, or a heterocycle group independently respectively. m expresses the integer of 3-11.

[0009] According to the invention of the 2nd of this invention, in the 1st invention, among m R at least three. A with a total carbon numbers of eight or more straight chain or an alkyl chain of a letter of branching, a with a total carbon numbers of four or more straight chain, or an oligoalkylene oxy chain of a letter of branching, A lubricant composition containing a substituent containing a with a total carbon numbers of two or more straight chain or a poly fluoridation alkyl chain of a letter of branching, a with a total carbon numbers of two or more straight chain, a poly fluoridation [alkyl ether] chain of a letter of branching, a straight chain, or an organic polysilyl chain of a letter of branching is provided.

[0010] According to the invention of the 3rd of this invention, in the 1st invention, the above-mentioned chemical formula [1] is expressed with a following chemical formula [2], namely, a lubricant composition which carries out the feature of D of a chemical formula [1] being a 1, 3, and 5-3 substitution triazine ring is provided.

[0011]

[Formula 4]



[0012] (X^1 , X^2 , and X^3 express respectively the connecting group of the bivalence which consists of a single bond, NR^1 group (the carbon number of R^1 is the alkyl group or hydrogen atom of 1-30), an oxygen atom, a sulfur atom, a carbonyl group, sulfonyl groups, or such combination independently among a formula.) R^{11} , R^{12} , and R^{13} express an alkyl group, an alkenyl group, an alkynyl group, an aryl group, or a heterocycle group independently respectively.

[0013] According to the 4th invention of this invention, in the 3rd invention, a lubricant composition which carries out the feature of all of X^1 , X^2 , and X^3 of the above-mentioned chemical formula [2] being the melamine compounds which are an imino group ($-NH-$) is provided.

[0014] And this invention relates to a lubricant composition which carries out the feature of containing a compound which has a specific structure as the main ingredients, as mentioned above, but the following are also included as a desirable mode.

- (1) The above-mentioned lubricant composition which carries out the feature of containing only a compound which has triazine structure.
- (2) The above-mentioned lubricant composition only containing a compound which has triazine structure, and an additive agent.
- (3) The above-mentioned lubricant composition blending an additive agent with base oil

which consists of a compound which has 0.1 to 20% of the weight of triazine structure, and 80 to 99.9% of the weight of mineral oil and/or synthetic oil on a base oil whole-quantity standard.

[0015]

[Embodiment of the Invention] Hereafter, this invention is explained in detail.

1. The compound used for the lubricant composition of compound this invention expressed with a chemical formula [1] as the main ingredients is a heterocyclic compound expressed with the following chemical formula [1].

[0016]

[Formula 5]



[0017] (Among a formula, D is heterocyclic residue of 5 thru/or 7 membered-ring structures located at the center of a molecule, and expresses the compound residue of cyclic structure which arranges m side chains radiately.) X expresses respectively the connecting group of the bivalence which consists of a single bond, NR¹ group (the carbon number of R¹ is the alkyl group or hydrogen atom of 1-30), an oxygen atom, a sulfur atom, a carbonyl group, sulfonyl groups, or such combination independently. R expresses an alkyl group, an alkenyl group, an alkynyl group, an aryl group, or a heterocycle group independently respectively. m expresses the integer of 3-11.

[0018] Although D of a chemical formula [1] is heterocyclic residue of 5 thru/or 7 membered-ring structures located at the center of a molecule, a five-membered ring or six membered-rings are more preferred, and its six membered-rings are the most preferred. As a concrete example of these skeletons, it is the Iwanami physicochemistry dictionary. Appendix of Chapter 11 of the 3rd edition enlarged edition (Iwanami Shoten issue) The compound indicated to the page 1606 of a name of an organic chemistry nomenclature table 4. main complex monocyclic compound is mentioned. It is more desirable for such heterocycles to have aromatic property.

[0019] When X of a chemical formula [1] is a single bond, it may couple directly with a nitrogen atom which had free valency like piperidine by a heterocycle group, and further, even if there is no free valency, it may join together with a hetero atom, and onium salt may be formed like oxonium salt, sulfonium salt, and ammonium salt. X of a chemical formula [1] has a sulfur atom or preferred NR¹ group, and R¹ has preferred alkyl group or hydrogen atom whose carbon number is three or less. Or a carbamoyl group, a sulfamoyl group, a carboxyl group, a sulfonic group, a hydroxyamino group, etc. are used.

[0020] Carbon numbers of an alkyl group are 1-30, as for R of a chemical formula [1], it is preferred that it is 2-30, it is more preferred that it is 4-30, and it is most preferred that it is 6-30. An alkyl group may be straight chain shape, or may be a letter of branching. It may have a substituent. As an example of a substituent, they are a halogen atom and an alkoxy group (ethoxy ** methoxy). sulfide groups (a methylthio and ethylthio.), such as methoxyethoxy one and phenoxy Alkylamino groups, such as propylthio (methylamino, propylamino, etc.), acyl groups (acetyl, propanolyl, octanoyl, benzoyl, etc.) and an acyloxy group (acetoxyl). Pivaloyloxy one, benzoyloxy one, etc. a hydroxyl group, a sulfhydryl group, an amino group, a carboxyl group, a sulfonic group, a carbamoyl group, a sulfamoyl group, an ureido group, etc. are mentioned. As for a carbon number and shape of an alkenyl group and an alkynyl group, R of a chemical formula [1] may have the same substituent synonymous with an alkyl group.

[0021] R of a chemical formula [1] has a phenyl group and a preferred naphthyl group, although a phenyl group, an indenyl group, alpha-naphthyl group, beta-naphthyl group, a fluorenyl group, a phenanthrene group, an anthracenyl group, a pyrenyl group, etc. are mentioned in an aryl group. It may have a substituent. What [1] was illustrated by a substituent of the above-mentioned alkyl group as an example of a substituent. A substituent which an alkyl group is mentioned and contains alkyl residue of with a carbon numbers of eight or more straight chain shape or a letter of branching, For example, an alkyl group (octyl, decyl, hexadecyl, 2-ethylhexyl, etc.), It is preferred to be replaced by alkoxy groups (dodecyloxy, hexadecyloxy, etc.), sulfide groups (hexadecylthio etc.), substituted amino group (heptadecylamino **), octylcarbamoyl group, octanoyl group, a decyl sulfamoyl group, etc. As for these two or more substituents, having replaced is preferred, and they may be replaced

by a halogen atom, hydroxyl, a cyano group, a nitro group, a carboxyl group, a sulfonic group, etc. other than the further above-mentioned substituent.

[0022]In a heterocycle group, like D, R of a chemical formula [1] has preferred heterocyclic residue of 5 thru/ or 7 membered-ring structures, a five-membered ring or six membered-rings are more preferred, and its six membered-rings are the most preferred. A concrete example of these skeletons is also the Iwanami physicochemistry dictionary. Appendix of Chapter 11 of the 3rd edition enlarged edition (Iwanami Shoten issue) Organic chemistry nomenclature Name of a table 4. main complex monocyclic compound Name of 1606 pages and a table 5. main condensation heterocyclic compound A compound indicated to 1607 pages is mentioned. As for these, it is preferred to be replaced by a substituent which may have a substituent and contains alkyl residue of with a carbon numbers of eight or more straight chain shape or a letter of branching like an aryl group. As for these two or more substituents, having replaced is preferred, and they may be replaced by a halogen atom, hydroxyl, a cyano group, a nitro group, a carboxyl group, a sulfonic group, etc. other than the further above-mentioned substituent.

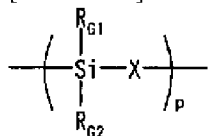
[0023]"Next, an invention of the 2nd of this invention is started A with a total carbon numbers of eight or more straight chain or an alkyl chain of a letter of branching, A with a total carbon numbers of four or more straight chain or an oligoalkylene oxy chain of a letter of branching, A substituent containing a with a total carbon numbers of two or more straight chain or a poly fluoridation alkyl chain of a letter of branching, a with a total carbon numbers of two or more straight chain, a poly fluoridation [alkyl ether] chain of a letter of branching, a straight chain, or an organic polysilyl chain of a letter of branching" is explained. As a with a total carbon numbers of eight or more straight chain alkyl chain, preferably, n-octyl group, n-octyloxy group, n-octylthio group, n-octylamino group, n-nonyl group, n-nonyloxy group, n-decyl group, an n-decyloxy group, n-undecyl group, n-undecyloxy group, n-dodecyl, n-dodecyloxy group, n-dodecyl thio group, n-dodecylamino group, an n-pentadecyl group, an n-pentadecyl oxy group, n-hexadecyl group, n-hexadecyloxy group, n-hexadecyl thio group, and n-hexadecylamino group are mentioned. As an alkyl chain of the with a total carbon numbers of eight or more letter of branching, A 2-ethylhexyl group, 2-ethylhexyloxy group, a 2-ethylhexyl thio group, A 2-ethylhexyl amino group, 2-hexyldecyl group, 2-hexyldecyl thio group, 2-hexyldecyl amino group, a 3,7,11,15-tetramethyl hexadecyl group, a 3,7,11,15-tetramethyl hexadecyloxy group, a 3,7,11,15-tetramethyl hexadecyl thio group, and a 3,7,11,15-tetramethyl hexadecylamino group are mentioned. As a with a total carbon numbers of four or more straight chain or an oligoalkylene oxy chain of a letter of branching, a diethyleneoxy group, the Tori ethylene oxy groups, tetra ethylene oxy groups, a dipropyleneoxy group, and hexyloxy ethyleneoxy ethylene oxy groups are mentioned.

[0024]As a with a total carbon numbers of two or more straight chain or a poly fluoridation alkyl chain of a letter of branching, a pentadecylfluoro heptyl group, pentadecylfluoroheptyl carbonyloxy group, a heptadecylfluorooctyl group, and a pentadecylfluorooctyl sulfonyl group are mentioned preferably. As a with a total carbon numbers of two or more straight chain or a poly fluoridation [alkyl ether] chain of a letter of branching, mixed stock and a propylene oxide system of methylene oxide and ethylene oxide are used as what consists of isopropanal pyreneoxide as a side chain type, and a straight chain type.

[0025]With a straight chain or an organic polysilyl chain of a letter of branching. That to which an atom group containing a silicon atom exists in a side chain of a long chain substituent, for example, poly (p-trimethylsilyl styrene), Poly (1-trimethylsilyl 1-propyne) etc. contain a silicon atom in a main chain of a long chain substituent, and contain a silicon atom in a main chain of a long chain substituent preferably. Straight chain shape, the shape of a branched chain, and an annular or many annular long chain substituent which have a repeating unit of structure shown by a lower formula as an example which contains silicon in a main chain are mentioned.

[0026]

[Formula 6]



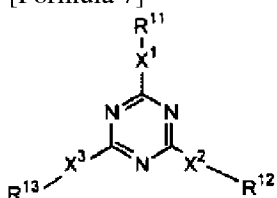
[0027](R_{G1} and R_{G2} express a substituent among a formula.) R_{G1} and R_{G2} may be connected mutually and may form a ring structure. X expresses a primitive team which consists of an oxygen atom, a nitrogen atom, an alkylene group, a phenylene group, a silicon atom, metal atoms, or such combination. p is an integer of 1-30.

[0028]As for a straight chain or an organic polysilyl chain of a letter of branching, a polysiloxane, polysilazane, poly sill methylene, poly sill phenylene, polysilane, a poly metalaw siloxane, etc. are mentioned, for example. X is an atom group who consists of combination of an oxygen atom or an oxygen atom, and an alkylene group preferably, and is an oxygen atom especially preferably. R_{G1} and R_{G2} are synonymous with the substituent R of each general formula, and an alkyl group preferably.

[0029]As D of a chemical formula [1], it is more preferred 5-3 substitution triazine ring [1, 3, and] [2], i.e., a following chemical formula, that it is the melamine compound by which it was preferred with which that it is a compound expressed, and a chemical formula [2] was replaced by an aromatic ring substituted amino group.

[0030]

[Formula 7]



[2]

[0031](X¹, X², and X³ express respectively the connecting group of the bivalence which consists of a single bond, NR¹ group (the carbon number of R¹ is the alkyl group or hydrogen atom of 1-30), an oxygen atom, a sulfur atom, a carbonyl group, sulfonyl groups, or such combination independently among a formula.) R¹¹, R¹², and R¹³ express an alkyl group, an alkenyl group, an alkynyl group, an aryl group, or a heterocycle group independently respectively.

[0032]When X¹ of a chemical formula [2], X², and X³ are single bonds, It may couple directly with the nitrogen atom which had free valency like piperidine by the heterocycle group, further, even if there is no free valency, it may join together with a hetero atom, and onium salt may be formed like oxonium salt, sulfonium salt, and ammonium salt. X¹ of a chemical formula [2], X², and X³, When it is not a single bond, it is NR¹ group (R¹). A carbon number expresses the connecting group of the bivalence which consists of the alkyl group or the hydrogen atom, the oxygen atom, the sulfur atom, the carbonyl group, the sulfonyl groups, or such combination of 1-30, for example, an oxycarbonyl group, an aminocarbonyl group, an ureylene group, a oxy sulfonyl group, a sulfamoyl group, etc. A sulfur atom or NR¹ group is preferred, and R¹ has preferred alkyl group or hydrogen atom whose carbon number is three or less. In this, an imino group (-NH-) is more preferred.

[0033]Carbon numbers of an alkyl group are 1-30, as for R¹¹ of a chemical formula [2], R¹², and R¹³, it is preferred that it is 2-30, it is more preferred that it is 4-30, and it is most preferred that it is 6-30. An alkyl group may be straight chain shape, or may be a letter of branching. It may have a substituent. As an example of a substituent, they are a halogen atom and an alkoxy group (ethoxy ** methoxy). sulfide groups (a methylthio and ethylthio.), such as methoxyethoxy one and phenoxy Alkylamino groups, such as propylthio (methylamino, propylamino, etc.), acyl groups (acetyl, propanoly, octanoyl, benzoyl, etc.) and an acyloxy group (acetoxo.) Pivaloyloxy one, benzoyloxy one, etc. a hydroxyl group, a sulfhydryl group, an amino group, a carboxyl group, a sulfonic group, a carbamoyl group, a sulfamoyl group, an ureido group, etc. are mentioned. As for a carbon number and shape of an alkenyl group and an alkynyl group, R¹¹ of a chemical formula [2], R¹², and R¹³ may have the same substituent synonymous with an alkyl group.

[0034]Although a phenyl group, an indenyl group, alpha-naphthyl group, beta-naphthyl group, a fluorenyl group, a phenan SURENIRU group, an anthracenyl group, a pyrenyl group, etc. are mentioned in an aryl group, R¹¹ of a chemical formula [2], R¹², and R¹³, A phenyl group and a naphthyl group are preferred. A substituent containing alkyl residue of with a carbon

numbers of eight or more straight chain shape or a letter of branching, For example, an alkyl group (octyl, decyl, hexadecyl, 2-ethylhexyl, etc.), an alkoxy group (dodecyloxy, hexadecyloxy, and 2-hexyl decyloxy.) It is preferred to be replaced by sulfide groups (hexadecylthio etc.), a substituted amino group (heptadecylamino **), an octylcarbamoyle group and octanoyl groups, such as hexyloxy ethyleneoxy ethyleneoxy, a decyl sulfamoyl group, etc. As for these two or more substituents, having replaced is preferred, and they may be replaced by a halogen atom, hydroxyl, a cyano group, a nitro group, a carboxyl group, a sulfonic group, etc. other than the further above-mentioned substituent.

[0035] In a heterocycle group, like D of a chemical formula [1], R¹¹ of a chemical formula [2], R¹², and R¹³ have preferred heterocyclic residue of 5 thru/or 7 membered-ring structures, a five-membered ring or six membered-rings are more preferred, and their six membered-rings are the most preferred. A concrete example of these skeletons is also the Iwanami physicochemistry dictionary. Appendix of Chapter 11 of the 3rd edition enlarged edition (Iwanami Shoten issue) Organic chemistry nomenclature Name of a table 4. main complex monocyclic compound A compound indicated to 1606 pages and the page 1607 of a name of a table 5. main condensation heterocyclic compound is mentioned. As for these, it is preferred to be replaced by a substituent containing alkyl residue of with a carbon numbers of eight or more straight chain shape or a letter of branching as well as an aryl group. As for these two or more substituents, having replaced is preferred, and they may be replaced by a halogen atom, hydroxyl, a cyano group, a nitro group, a carboxyl group, a sulfonic group, etc. other than the further above-mentioned substituent. To R¹¹ of a chemical formula [2], R¹², and R¹³. "An invention of the 2nd of said this invention is started A with a total carbon numbers of eight or more straight chain or an alkyl chain of a letter of branching, A with a total carbon numbers of four or more straight chain or an oligoalkylene oxy chain of a letter of branching, It is more preferred that a substituent containing a with a total carbon numbers of two or more straight chain or a poly fluoridation alkyl chain of a letter of branching, a with a total carbon numbers of two or more straight chain, a poly fluoridation [alkyl ether] chain of a letter of branching, a straight chain, or an organic polysilyl chain of a letter of branching" is included. Especially a phenyl group replaced as R¹¹ of a chemical formula [2], R¹², and R¹³ by a substituent containing alkyl residue of with a carbon numbers of eight or more straight chain shape or a letter of branching is preferred.

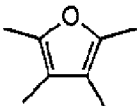
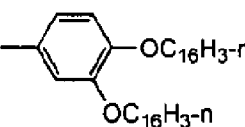
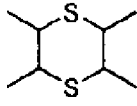
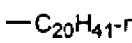
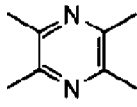
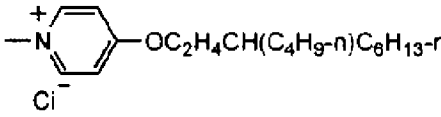
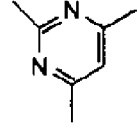
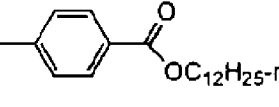
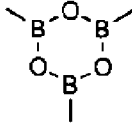
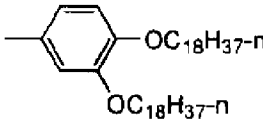
[0036] A lubrication action of a compound which has the triazine structure where it is used for a lubricant composition of this invention as the main ingredients, Although it is not yet clear, this invention persons have imagined it as that from which lubrication characteristics, such as a low friction coefficient, are acquired according to an adsorption effect, and the surface activity effect or an orientation effect by the triazine structure itself to a slide member (metal) by triazine structure, especially melamine structure. Therefore, a compound of disc-like structure in which arrangement which is smoothness and was laminated also in a compound which has triazine structure is possible is preferred, and a liquid crystallinity compound is preferred. A compound group called a discotic liquid crystal is contained in these.

[0037] A heterocyclic compound expressed with a chemical formula [1] used for a lubricant composition of this invention can be manufactured with various techniques, and there is no restriction in particular about a raw material and a manufacturing method. Most compounds of triazine structure expressed with a chemical formula [2] are easily compoundable from cheaply available cyanuric chloride. Since a compound which has triazine structure is excellent also in compatibility with an additive agent for mineral oil, synthetic oil, and lubricating oils usually used, it is useful also as a substrate in a lubricant composition. As the description, a practical liquefied thing can be preferably used in ordinary temperature and atmospheric pressure. Since it is made a practical liquefied thing, the compound which has triazine structure can mix a compound which has not only a single compound but various triazine structures, and can also be used.

[0038] Although a concrete example of a compound used for a lubricant composition of this invention is given to below, this invention is not limited to these.

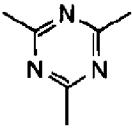
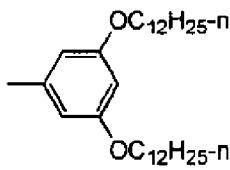
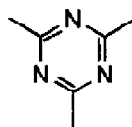
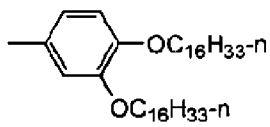
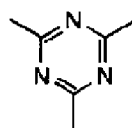
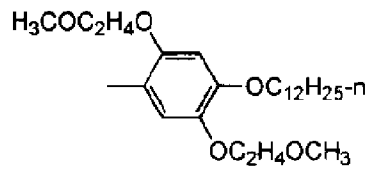
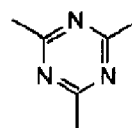
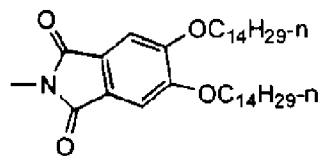
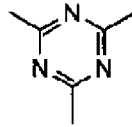
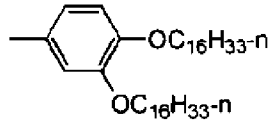
[0039]

[Formula 8]

D	X	R
LUB-1 	—	
LUB-2 	—S—	
LUB-3 	—	
LUB-4 	—NH—	
LUB-5 	—	

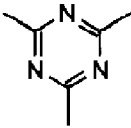
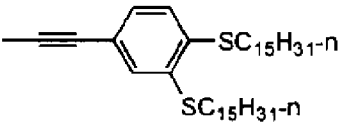
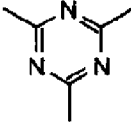
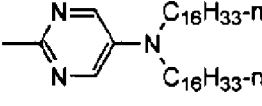
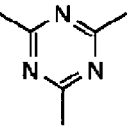
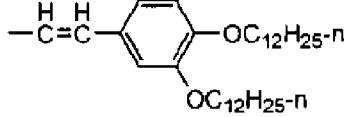
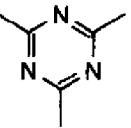
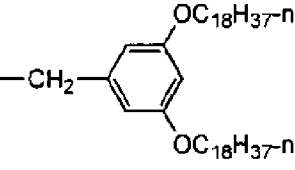
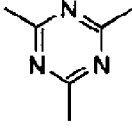

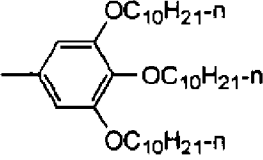
[0040]

[Formula 9]

D	X	R
LUB-6 	$\text{—NH—SO}_2\text{—NH—}$	
LUB-7 	—NH—CONH—	
LUB-8 	$\text{—O}_2\text{S—}$	
LUB-9 	—	
LUB-10 	—NHO—	

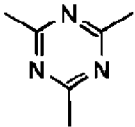

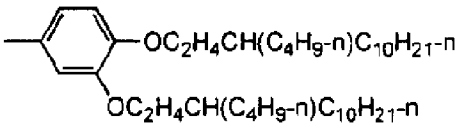
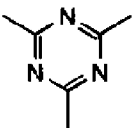

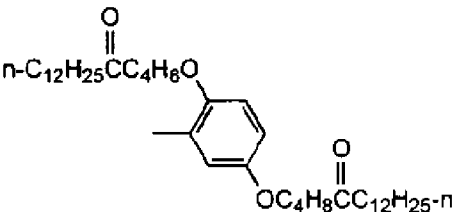
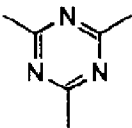

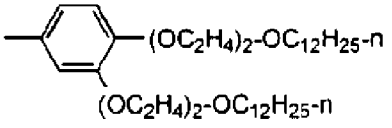
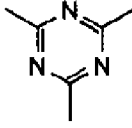

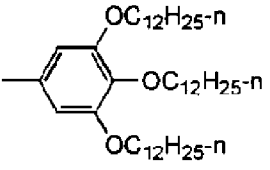
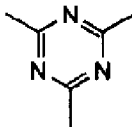

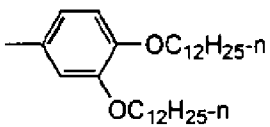
[0041]

[Formula 10]

D	X	R
LUB-11 	—	
LUB-12 	—	
LUB-13 	—S—	
LUB-14 	—O—	
LUB-15 		

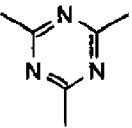

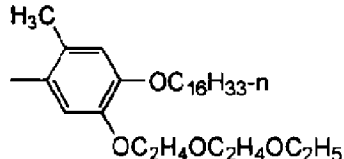
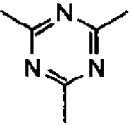

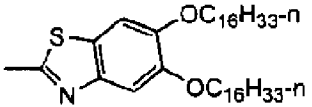
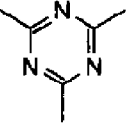

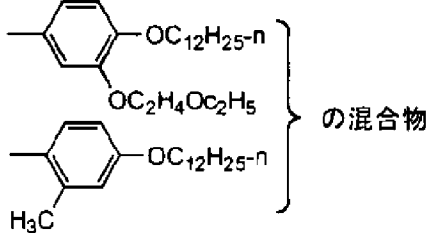
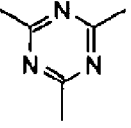
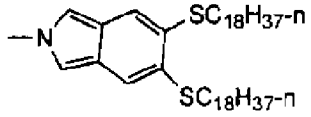
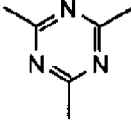

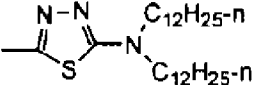
[0042]

[Formula 11]

D	X	R
LUB-16 		
LUB-17 		
LUB-18 		
LUB-19 		
LUB-20 		

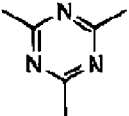

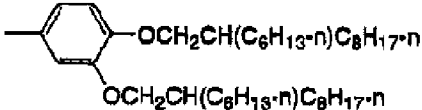
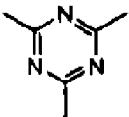

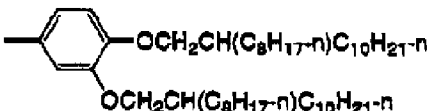
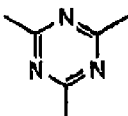

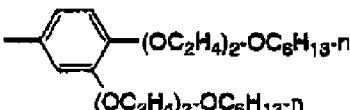
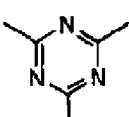

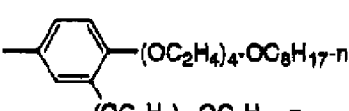
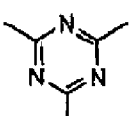

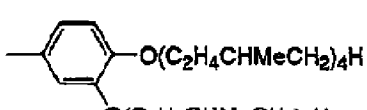
[0043]

[Formula 12]

D	X	R
LUB-21 		
LUB-22 		
LUB-23 		
LUB-24 		
LUB-25 		

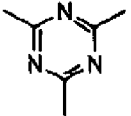

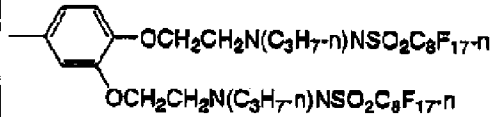
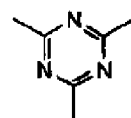

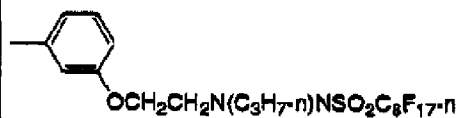
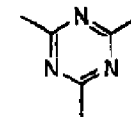

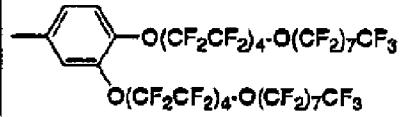
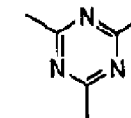

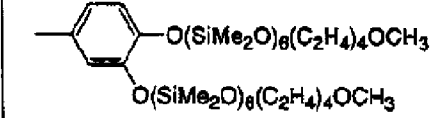
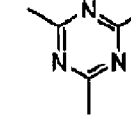
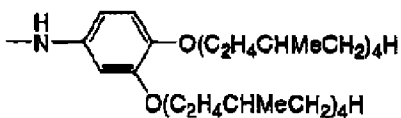
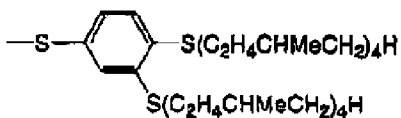
[0044]

[Formula 13]

D	X	R
LUB-26 		
LUB-27 		
LUB-28 		
LUB-29 		
LUB-30 		

[0045]

[Formula 14]

D	X	R
LUB-31 		
LUB-32 		
LUB-33 		
LUB-34 		
LUB-35 		  1 2

[0046]2. Although the compound expressed with the aforementioned chemical formula [1] used for the lubricant composition of lubricant composition this invention is only itself and can be used as a substrate oil of a lubricant composition, Usually, it mixes with mineral oil and synthetic oil which are used as base oil of a lubricating oil composition, and is used also as a substrate oil of the lubricant composition of this invention. As a mixed base material oil, in particular mineral oil or synthetic oil that are used are not limited, and if generally used as lubricant base oil, they can be used anything. That is, mineral oil, synthetic oil, or those mixed oils to correspond to these exist. As mineral oil, the charge of lubricous Yuhara derived by the ordinary pressure or distillation under reduced pressure of paraffin series, a Motoi Nakama system, or a naphthenic crude oil, for example Phenol, Furfural, the solvent refining raffinate produced by processing with the aromatic extraction solvent like N-methyl pyrrolidone, The hydrogen treatment oil produced by contacting the charge of lubricous Yuhara in hydrogen under hydrogen treatment conditions under existence of catalysts for hydrogen treatment, such as cobalt which makes silica alumina a carrier, and MORIPUDEN, The hydrocracking oil produced by contacting in hydrogen under severe decomposition reaction conditions under

existence of a hydrocracking catalyst, The lubricating oil fraction etc. which are obtained combining the isomerized oil produced by contacting a wax in hydrogen under isomerization conditions under existence of the catalyst for isomerization or solvent refining processes and a hydrogen treatment process, a hydrocracking process, an isomerization process, etc. can be mentioned. It can mention as what has suitable high-viscosity-index mineral oil especially obtained by the hydrocracking process or an isomerization process. Also in which manufacturing method, processes, such as a winterization process, a hydrofinishing process, and a clay-treatment process, are arbitrarily employable with a conventional method. Base oil can be adjusted by mentioning light neutral oil, the nature neutral oil of inside, heavy neutral oil, bright stock, etc., and mixing suitably as an example of mineral oil, so that demand description may be fulfilled. As synthetic oil, poly alpha olefin, alpha-olefin oligomer, polybutene, alkylbenzene, a polyol ester, a dibasic acid ester, polyoxy alkylene glycol, polyoxyalkylene glucoside ether, silicone oil, etc. can be mentioned, for example. Such base oil is independent, respectively, or can be used combining two or more sorts, and may be used combining mineral oil and synthetic oil. it may be used as a mixed base material oil of the lubricant composition of this invention -- such -- generally base oil has the kinetic viscosity of 2-20-mm²/s in 100 **, and suitable kinetic viscosity is usually the range of 3-15 mm²/s. A mixed base material oil with the optimal kinetic viscosity is suitably chosen so that it may be suitable for the lubrication condition of the mechanical-friction sliding part for which the lubricant composition of this invention is used.

[0047]With a compound which has the triazine structure expressed with the aforementioned chemical formula [2] in a lubricant composition of this invention, usually a blending ratio with base oil, On a substrate oil whole-quantity standard, a compound which has the former triazine structure is usually 0.1 to 20 % of the weight, and latter usual base oil, i.e., mineral oil, and/or synthetic oil are 80 to 99.9 % of the weight. A compound which has triazine structure is 0.1 to 10 % of the weight preferably, and a compound which has triazine structure is 0.1 to 1 % of the weight most preferably. However, can use a compound which has triazine structure as a substrate oil of a lubricant composition, and it is more effective to use it independently only in itself, as described above in many cases, and a low friction coefficient is obtained also by a severe lubrication condition in a wide temperature requirement, and an effect which was simultaneously excellent also in abrasion resistance is demonstrated.

[0048]Although a lubricant composition of this invention contains a compound expressed with the aforementioned chemical formula [1] as the main ingredients, In order to secure performance in use which was adapted for various uses, if needed further. Various additive agents used for lubricant, for example, bearing oil, gear oil, a transmitting power oil, etc., i.e., an antiwear agent, an extreme pressure agent, an antioxidant, a viscosity index improver, a detergent additive, a metal deactivator, corrosion inhibitor, a rust-proofer, a defoaming agent, etc. can be suitably added in the range which does not spoil the purpose of this invention.

[0049]On a severe lubrication condition, a lubricant composition of this invention has the features, such as that a coefficient of friction is low and excelling in abrasion resistance and an extreme pressure property. By mixing and making it optimal thing have at least liquefied -40 **, i.e., what etc., also at low temperature, a lubricant composition of this invention becomes usable and can do various compounds expressed with a chemical formula [1], and compounds which have the triazine structure preferably expressed with a chemical formula [2] with a practical thing.

[0050]Taking advantage of the above features, a lubricant composition of this invention in lubricant, such as the conventional lubricating oil and grease. Without it seeming that printing is produced even if it is a severe lubrication condition which produces an oil film piece, it is abrasion resistance, and a low friction coefficient can be obtained and it can be conveniently used as lubricant [*****] in a bearing, a gear, etc. of a severe lubrication condition. And since a lubricant composition of this invention does not produce printing even if it is a severe lubrication condition, its reliability of a sliding part device can improve and it can be contributed to a miniaturization of a sliding part device.

[0051]
[Example]Although an example and a comparative example are given to below and explained more concretely about this invention, this invention is not limited only to these examples. Evaluation of the lubricant composition of an example and a comparative example was

performed by the following method.

[0052]1. The evaluation, the measuring method coefficient of friction, and abrasion resistance by a reciprocated type (SRV) friction wear test were evaluated using the reciprocated type (SRV) frictional wear tester, and the friction wear test was done by the test condition shown below. Abrasion resistance was evaluated by measuring the wear depth of an abrasion with a surface roughness plan.

A test condition and a specimen (friction material): SUJ-2 and plate : Diameter [of 24 mm] x7 mm and, cylinder : Diameter [of 15 mm] x22 mm and, temperature : 100 ** and load : 50N, 400N and amplitude : 1.0 mm and pitch : 50 Hz and test time : For [start of test] 2 minutes (after 2 minutes)

[0053]2. Using LUB-20, LUB-26, and LUB-28 as a compound which has the compound and the lubricant composition [examples 1-3] triazine structure of having triazine structure, it was respectively considered as lubricant independently and evaluation by a reciprocated type (SRV) friction wear test was carried out. This result is shown in Table 1. The time of low load (50N) and high load (400N) conditions is a low friction coefficient, the abrasion depth is set to 0.0 micrometer and the friction characteristic and abrasion resistance are good.

[0054][Comparative examples 1-7] The comparative examples 1-3 were only the friction modifiers which are usually blended with a lubricating oil composition and which are shown in Table 1, were used as lubricant and carried out evaluation by a reciprocated type (SRV) friction wear test like Example 1. These results are shown in Table 1. The comparative examples 4-7 were only the lubricant base oil which is usually blended with a lubricating oil composition and which is shown in Table 1, were used as lubricant and carried out evaluation by the reciprocated type (SRV) friction wear test of low load (50N) conditions. These results are also shown in Table 1.

[0055]

[Table 1]

実施例 1	実施例 2	実施例 3	比較例 1	比較例 2	比較例 3	比較例 4	比較例 5	比較例 6	比較例 7
100	100	100	100	100	100	100	100	100	100
0.06	0.05	0.08	0.13	0.14	0.16	0.21	0.22	0.25	0.22
0.0	0.0	0.0	0.1	0.0	0.8	0.7	0.6	0.8	0.7
0.04	0.04	0.05	0.08	0.10	0.12	—	—	—	—
0.0	0.0	0.0	0.1	0.0	1.3	—	—	—	—

実施例	1	10	-	-	-	-	-	-	-	-	-
トリアジン構造の化合物	LUB-20	重量%	LUB-26	重量%	LUB-28	重量%					
摩擦調整剤		重量%									
ソルビタンモノオレエート											
酸性リン酸エステル*1											
アルカノールアミン*2											
潤滑油基油		重量%									
ペンタエリスリトールエステル*3											
アルキルベンゼン*4											
ナフテン系鉱油											
パラフィン系鉱油											
S R V 摩擦摩耗試験 @50N,100°C											
・摩擦係数											0.
・摩擦痕深さ (μm)											0.
S R V 摩擦摩耗試験 @400N,100°C											
・摩擦係数											0.
・摩擦痕深さ (μm)											0.

*1：オレイルアルシッドホスファイト

*2：ジエタノールのトデシルアミン

*3：ペンタエリスリトールのヘキサノ酸エステル

*4：アルキル基がC10であるアルキルベンゼン

[0056]By using for the base oil of lubricant the compound which has triazine structure as the main ingredients from the evaluation result of these examples and comparative examples, also on the high load condition, it excelled in abrasion resistance, and the coefficient of friction was low, and it became clear that a practical lubricant composition was obtained.

[0057]
[Effect of the Invention]according to this invention -- mechanical-friction sliding part **** -- it excels in abrasion resistance, an extreme pressure property, and the low friction characteristic, and a practical lubricant composition is provided. The lubricant composition of this invention in lubricant, such as the conventional lubricating oil and grease. Without it seeming that printing is produced even if it is a severe lubrication condition which produces an oil film piece, it is abrasion resistance, and a low friction coefficient can be obtained and it can be conveniently used as lubricant [*****] in a bearing, a gear, etc. of a severe lubrication condition. Since the lubricant composition of this invention produces neither wear nor printing even if it is a severe lubrication condition, its reliability of a sliding part device can improve and it can be contributed to the miniaturization of a sliding part device.

[Translation done.]